ARROW WOUNDS

By THOMAS WILSON

Baron Percy, the author of the *Manuel du Chirurgien d'Armée*, declared that military surgery had its origin in the treatment of wounds inflicted by arrows and spears, and in proof thereof he quoted from ancient classics[1] and cited Chiron's and Machaon's patients, Menelaus and Philoctetes, and Eurypyles treated by Patroclus. He believed the name "medicus" in the Greek anciently signified "sagitta," an arrow,[2] and declared that Hippocrates used a particular forceps, "belulcum," for extracting arrows, which his successor, Diocles, improved and called "graphiscos."[3] Heras of Cappadocia, in the wars of Augustus, invented the duck-bill forceps. Celsus[4] taught the necessity of dilating the wound in order to extract the arrowpoint, and Paulus Ægineta[5] treated arrow wounds in a peculiarly successful manner.

Baron Percy, who thus showed his knowledge of classic medical literature, supposed he had discovered the origin of surgery and was dealing with the earliest wounds made by man with the machinery of war; but the scientific discovery, during the nineteenth century, of prehistoric man, and the repeated findings of graves and cemeteries belonging to the Neolithic and Bronze ages, with their thousands of skeletons—many of them with wounds and fractures—have completely overturned Baron Percy's theory regarding the earliest human wounds and the origin of surgery.

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[1] Homer, *Iliad*, book XI.

[2] Sextus, *Advers. Math.*, book I, chap. 2.

[3] *Andrea della Croce*, book VII, p. 173.

[4] *De Medicina*, book VII, chap. 5.

[5] *De re Medica*, book VI, chap. 88.

We know how the ages of Stone and Bronze had passed away prior to the beginning of history, and how the world was left without knowledge of their existence. Arrowpoints of stone were used by thousands in times of antiquity, but those known to the history of civilization were of iron or bronze; none were of stone. In the army of Xerxes only one tribe—blacks from the interior of Africa—had arrows tipped with stone; the age of stone arrowpoints or spearheads had passed away before the time of Xerxes. All this shows how mistaken was the author of the *Manuel du Chirurgien d'Armée* in his opinion concerning the origin of surgery and the dates of the earliest wounds made by man's weapons.

It has been thought by many persons, among them those qualified to judge, that no burials were made during the Paleolithic period in western Europe. Whether this be true or not it must be admitted that, because of the rarity of the burials or the length of time which has elapsed,—or possibly because of the failure to discover the graves,—comparatively few osseous remains of Paleolithic man have been found. This would satisfactorily account for the few evidences of wounds that have been observed.

The skeletons from the cave at Cro-Magnon show indications of wounds. The femur of the man has been broken, while the forehead of the woman who lay beside him bears a large gash, made apparently with a hatchet. Broca,[1] who examined these specimens, is of opinion that the latter bore traces of suppuration and evidences of healing. Dr Hamy reports many of the bones in the cavern at Sordes as having curious wounds—one a gaping wound in the right parietal of a woman who, like the one of Cro-Magnon, must have survived the injury for some time. Pieces of bone had been removed and there was evidence of healing.[2]

Whether these caves and the burials found therein belonged

[1] *Les Ossements des Eyzies*, Paris, 1868.

[2] Lartet and Chaplain-Duparc, *Une Sepulture des Anciens Troglodytes des Pyrenées.*

to the Paleolithic period may be left undetermined so far as concerns the present investigation; but we will see that in the Neolithic period such wounds, made sometimes by hatchets or by blows from other weapons, and sometimes by thrusts received from arrows or spears, were found in considerable number.

The late Dr Prunières, of Marvajols (Lozère), France, surgeon, anatomist, and early student of prehistoric archeology, conducted many original excavations into the dolmens, tumuli, and burial-places of his neighborhood, and before his death possessed a large collection of objects pertaining to prehistoric man in that section. He took special care to search for and to preserve all specimens relating to physical anthropology, especially those showing skeletal peculiarities. The following is a partial list of objects in his collection relating to arrow wounds:

The superior portion of a tibia, with a deep and suppurated wound, in which is still embedded a flint arrowpoint.

Fragment of the iliac bone, in the internal part of which is embedded an arrowpoint of flint in a wound which shows signs of suppuration.

Another fragment of iliac bone, in the external part of which was embedded an arrowpoint of flint in a suppurated wound.

A dorsal vertebra with a flint arrowpoint in a wound in the body of the vertebra—no suppuration.

Lumbar vertebra with a wound which has been much enlarged by suppuration and having an arrowpoint embedded in it.

A vertebra with an arrowpoint buried in the body.

A vertebra with an arrowpoint buried in the wound.

An astragalus with an arrowpoint in the wound.

The caverns of Baumes-Chaudes and L'Homme Mort were charnel-houses of Neolithic times, each containing about three hundred skeletons capable of identification. It was out of this wealth of material that Dr Prunières was able to obtain such a large number of peculiar specimens.

The anthropologists of France have always realized the importance of examining and preserving early pathologic or traumatic specimens, and many, especially De Mortillet, Cartailhac,

Nadaillac, de Baye, Hamy, and Capitan, have reported specimens bearing evidence of arrow wounds.

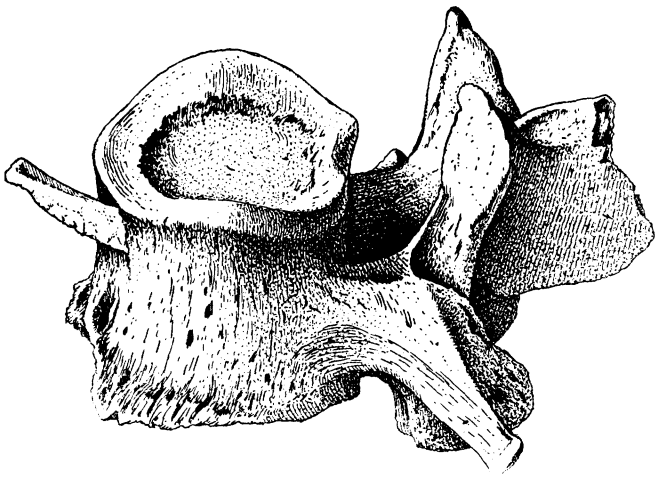

FIG. 59—Prehistoric human vertebra pierced by flint arrowpoint. (Cartailhac, *La France Préhistorique*, p. 254, fig. 124.)

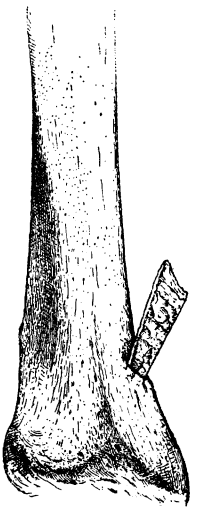

FIG. 60—Prehistoric human tibia pierced by flintarrow-point. France.

Fig. 59 represents a human vertebra pierced by an arrowpoint, *tranchant transversal*, from the cavern of Pierre-Michelot (Marne), collected by Baron de Baye. Fig. 60 illustrates a human tibia penetrated by an arrowpoint, found in the dolmen of Font Rial near Saint Affrique (Aveyron). Next to Dr Prunières, Baron de Baye has been one of the most successful seekers for such specimens. In the cavern of Villevenard he found one skull containing three *tranchant transversal* arrowpoints, while another was lodged between the dorsal vertebræ. Other human vertebræ pierced with flint arrowpoints were found in the caves of Petit-Morin. In one sepulchral cavern the Baron found seventy-three flint arrowpoints, and, as in the case of Villevenard, their position was such as to lead to the supposition that they had been embed in the flesh at the time of interment and had fallen down as decomposition progressed. A human vertebra was found by M. Cartailhac in the covered way of Castellet, near Arles, with a stone arrowpoint incrusted therein. The absence of any exostosis shows that death quickly followed.

Another human vertebra pierced by an arrowpoint, which appears to have passed entirely through the body, was found in the cavern of La Tourasse near Saint-Martory, Haute Garonne, and has been described by M. Émile Cartailhac.[1] The archeological museum of the Jardin des Plantes, under Dr E. Hamy, contains a number of specimens of human and animal bones penetrated by arrowpoints. By noting the prehistoric specimens alone, the list might be considerably enlarged; but enough has been presented to show the general use of arrows and spears in deadly contests during prehistoric times.

The skull of an ancient Indian man of advanced age, originally received by the Smithsonian Institution from Dr C. Yates, of Alameda county, California, and transferred to the Army Medical Museum, exhibits a wound made by a long flint arrowpoint which penetrated the left orbit (fig. 61). The arrowpoint illustrated belongs to the class usually called perforators, or drills, but in this instance it was used as an arrowpoint.

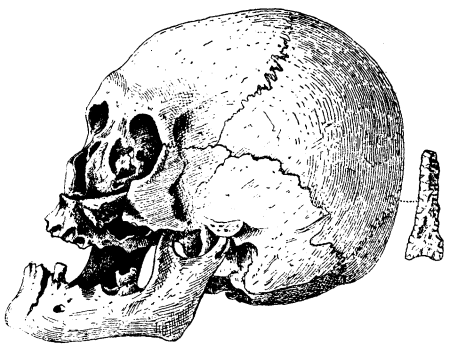

FIG. 61—Ancient skull pierced by a flint arrowpoint (perforator). California. (Army Med. Mus., cat. 5531.)

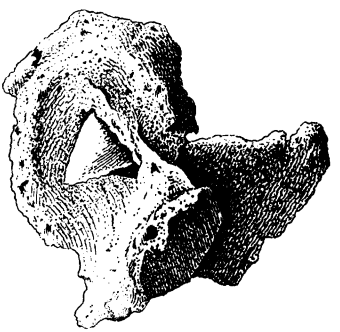

FIG. 62—Ancient human vertebra pierced by a quartz arrowpoint; healed. (Army Med. Mus., cat. 5553.)

Fig. 62 also shows a prehistoric specimen unearthed in 1869 from an Indian mound in the vicinity of Fort Wadsworth, Dakota, by Surgeon A. T. Comfort, U. S. A. It consists of a human lumbar vertebra with a small arrowpoint of white quartz

[1] *L'Anthropologie*, VII, p. 3, 1896.

incrusted in it. The vertebra is covered with a new bony formation, showing that the wounded man survived the injury for some months at least.

An ancient aboriginal skull from Henderson county, Illinois, contributed to the National Museum by M. Tandy, is shown in fig. 63. It had a hole in the squamosal bone on the left side, inserted in which, when found and received by the museum, was a stone arrowpoint also of the perforator or drill type.

FIG. 63—Ancient skull pierced by perforator arrowpoint. Illinois. (U. S. Nat. Mus., cat. 60281, 60282.)

FIG. 64—Arrow wound over left orbit of ancient skull; entirely healed. Missouri. (U. S. Nat. Mus., cat. 173995.)

A human skull from a mound in Missouri is represented in fig. 64. The subject had received a serious wound in the left supraorbital arch, which involved the bones of the interior arch, causing it to break down; but the wound had entirely healed, the cicatrization was complete, and all the wasted or destroyed pieces of bone around the wound had sloughed off and reparation of the edges had taken place. Of course the missile which penetrated the skull did not remain in the wound, and was not found, but from its superficial smallness and its depth there is no doubt that the wound was made by an arrowpoint.

Two specimens of prehistoric flint arrowpoints or spearheads found inserted in human bones are represented in plate XVII. These specimens were sent to the National Museum by Dr John E. Younglove, of Bowling Green, Kentucky. No. 1 shows an

implement 3½ inches long, 1⅜ inch wide, and ¼ of an inch thick. The stem is broken, which shortens it considerably. It had pierced the pelvic bone. No. 2 is 4 inches long, 1⅜ inch wide, and ¼ of an inch thick, and is inserted in the head of a human femur (?). No. 1 is loose, so that it may readily be taken out of its present socket; but No. 2 is firmly embedded. The material of both points is the black or brown lusterless pyromachic flint common to the country in which it was found. The specimens came from a cavern about four miles northeast of Bowling Green, and an equal distance from Old Station. The opening of the cave was about 3 feet in diameter and the hole about 40 feet in depth. At its bottom the cave extended horizontally several hundred feet through apparently solid rock.

Most of the specimens of arrows and arrow wounds in the Army Medical Museum pertain to modern Indian warfare. The arrowpoints of iron or steel show, by actual experience and ocular demonstration, the effect of these projectiles upon bones, the endurance of the patient, and the skill of the surgeon; consequently they are of considerable interest. They also show that none of the arrowpoints were poisoned.

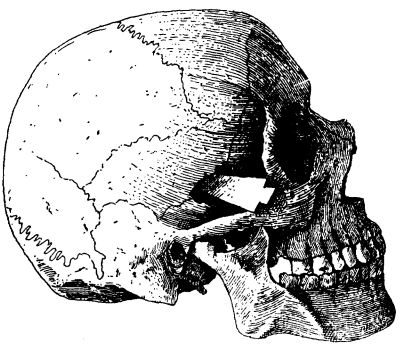

FIG. 65—Skull of a white man pierced by arrowpoint in Indian fight near Pecos river, Texas, 1870. (Army Med. Mus., cat. 5907.)

Fig. 65 illustrates an arrow wound which was treated by W. M. Notson, Assistant Surgeon, U. S. A. An attack was made by Indians near Pecos river, Texas, September 1, 1870, in which one man was killed, one escaped, and the patient received an arrow wound in the head and three gunshot flesh-wounds. Seven days later he was admitted to the hospital at Fort Concho, Texas, having traveled part of the distance on foot. He complained of

soreness from the gunshot wounds, but spoke lightly of the "scratch" made by the arrow on the side of his head. The gunshot wounds healed, but cerebral complications developed. An effort was made to reopen the wound in the temple, which proved unsuccessful on account of the resistance of the temporal facia, and doubt as to the cause of the existing symptoms prevented the surgeon from making a free incision. The case terminated fatally September 19, and the autopsy revealed the real injury to have been caused by the entry of the iron arrowhead half an inch from the external incision.

Fig. 66 represents the case of Martin W——, of Co. E, 4th Cavalry. He was on duty as one of the mail-stage guards from

FIG. 66—Skull of United States cavalryman pierced by iron arrowhead by band of Comanche, near Fort Concho, Texas. (Army Med. Mus., cat. 5908.)

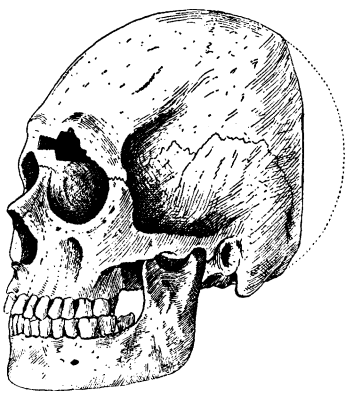

FIG. 67—Skull of a Mexican killed in Indian fight 75 miles northwest of Fort Concho, Texas, 1868. (Army Med. Mus., cat. 5644.)

Fort Chadbourne. About twenty miles from Fort Concho, Texas, the stage was attacked by a band of Comanche. This soldier was wounded by an iron-headed arrow, which entered the squamous portion of the left temporal bone and penetrated the left cerebral hemisphere to the depth of an inch or more, causing intracranial bleeding, which was speedily fatal. The puncture of the thin calvaria without fissuring is well indicated; internally there is no splintering. The vitreous table is as cleanly divided as is the outer table.

Fig. 67 represents the skull of a Mexican killed by an arrow in an Indian fight seventy-five miles northwest of Fort Concho, Texas, February 22, 1868. He was treated by W. M. Notson, Assistant Surgeon, U. S. A., who reported:

> When I opened the skull I found an incision extending clear across the opposite hemisphere, touching the dura mater just above the tentorium. The dura mater was stained, but I could find no mark on the, skull. When I made the post mortem I found the arrowhead in the brain. When the patient was hit, he seized the arrowshaft with both hands and pulled it out, then dropped and remained unconscious until he died, about six hours after.

Private John Krumholz, Co. H, 22d Infantry, was wounded at Fort Sully, South Dakota, June 3, 1869, by an arrow which entering at the outer canthus of the left eye, penetrated the skull two inches, and is supposed to have passed between the skull and the dura mater. The operation for extraction, which was immediately performed, consisted in sawing nearly through the skull with a Hey's saw, in close proximity to the arrow. Recovery was rapid, the soldier returning to duty June 7 (?).

The iron arrowpoint shown in plate XVIII, *d*, represents a very interesting case. Private Snowden, 14th Infantry, was one of a party surprised by Apaches, March 22, 1866, while en route from Maricopa Wells to Fort Goodwin, Arizona. He was struck in the back of the head by an arrow, which penetrated the skull, and nine days later reached Maricopa Wells, weak and fatigued, but unimpaired in intelligence. He believed the arrowpoint to be within the cranium, since, in pulling on the shaft after receiving the injury, nothing but the shaft responded. The usual treatment was being given with success, when in examining the scalp there was discovered a small tumefaction over the parietal side of the left occipito-parietal suture. Pressure caused the issue of a small quantity of serous matter from the cicatrix of the arrow wound. This was enlarged, and a probe passed into it was made to feel along the fissure in the bone, when it struck something

metallic. The cranium was laid bare by a crucial incision, and with considerable difficulty a hoop-iron arrowhead 1¾ inch long and ½ inch in breadth was withdrawn from the brain. About a dram of pus followed it. After the operation the right side of the body was observed to be paralyzed. The patient's condition fluctuated, but the first week in May his improvement had been such as to cause belief in his ultimate recovery. On the 7th he ate something which disagreed with him and gradually grew worse until the morning of the 13th when death ensued. The post mortem showed that the brain tissue to the extent of three-fourths of an inch around the track of the arrowpoint was softened and disorganized.

Private William Drum, 14th Infantry, was wounded in a fight with Apaches, November 11, 1867. One arrow entered over the malar bone of the left side of the face, and passed along the lower border of the orbit to within half an inch of the nose. Another arrow entered through the tendons of the latissimus dorsi muscle on the right side and passed directly backward toward the spine under the deep muscles, penetrating 2½ inches. On the 19th the arrowpoint was cut out, the parts healed by first intention, and on December 3 the patient was returned to duty.

John Fenske, a civilian, aged 19 years, came to Fort Ridgely, Minnesota, on the night of August 20, 1862. He had been wounded on the previous day by an Indian arrow, shot from a distance of about twelve feet, which had entered horizontally between the third and fourth ribs on the left side, close to the vertebræ. The arrow—a barbed one with a head about three inches long—was buried an inch below the surface of the skin and had penetrated the left lung. On account of the barbs, it became necessary to make a large perpendicular incision in order to remove the arrowhead, which required considerable pulling, the sharp edges having been wedged in between the ribs with such force as to bend them over on each side. After dressing and the usual treatment, a healthy suppuration ensued, and the wound

closed by granulation in thirteen days. The surgeon reported that "it was evident in this case that the arrow had penetrated the lung," which diagnosis was fully corroborated by the objective as well as the subjective symptoms. The patient left the hospital for his home, September 30, 1862, forty-two days after receiving the injury. The surgeon met this patient four years after and found the pleural symptoms considerably ameliorated.

Private Hardwick, 14th Infantry, was wounded in an engagement with Indians near Bower's ranch, Arizona, November 11, 1867. One arrow penetrated the rectus femoris muscle at the center and passed upward and inward to the bone; another arrow entered the center of the belly of the biceps cruris muscle and penetrated to the bone. The surgeon operated upon him on the field, enlarged the wound of the thigh, and removed the arrow. The patient was sent to Camp Whipple; on December 15 both wounds had healed, on the 28th he was able to walk on crutches, and in January he returned to duty.

Surgeon J. H. Bill[1] remarks on the rapidity with which the American Indians discharge their arrows, stating that an individual receiving one wound is almost sure to receive others, and the records of the surgeons tend to substantiate his assertion. Private Imbler, 31st Infantry, while within a few hundred yards from camp at Fort Stevenson, Dakota, October 10, 1867, received three severe wounds from Indian arrows. One of the arrowpoints entered above the left scapula, transfixed the left posterior triangle of the neck, and was extracted at the angle of the jaw; a second passed through the fleshy portion of the right forearm; a third pierced the ulnar side of the left forearm near the elbow. The last was the most serious wound; the distorted head of the arrow was extracted near the wrist, and, save for partial paralysis of the left hand, the patient speedily recovered.

Private Nix, 14th Infantry, was wounded near Camp Lincoln, Arizona, in October, 1868. He received a gunshot flesh-wound in

[1] *American Journal of Medical Sciences*, XLIV, p. 365.

the upper portion of the left arm, a cut from an arrow in the left ear, two flesh wounds from arrows (from which the hemorrhage was profuse), two arrow wounds in the right knee, one gunshot wound in the right elbow and another through the right hand. He was conveyed to camp, riding part of the time on a horse with a comrade, during which time, eight hours, he became very weak from loss of blood and died the next morning.

Nat Crabtree, a citizen of Montana, while searching for cattle, April 24, 1868, received nine arrow wounds. He was conveyed to Camp Cook. Some of the arrows had been removed by his friends, but five, one of which had penetrated 10½ inches, were taken out at the post. The man died a few hours after admission.

A remarkable case of arrow wounds was that of Private Osborn, 2d Nebraska Cavalry, wounded in a skirmish with Indians near Pawnee Reserve, Nebraska, June 23, 1863. Eight arrows entered different parts of his body, and all were extracted except the head of one which had entered at the outer and lower margin of the right scapula and passed upward and inward through the upper lobe of the right lung or trachea. The hemorrhage was so severe that all hope of his recovery was abandoned. The patient, however, rallied, but continued to suffer great pain on swallowing or coughing, and occasionally spat blood. In July, 1866, more than three years afterward, he called upon Dr J. H. Peabody to be examined for a pension. Upon probing through a small fistulous opening just above the superior end of the sternum, the point of the arrow was found resting against the bone about an inch and a half below, the head lying flat against the trachea and esophagus, with the carotid artery, jugular vein, and nerves overlying it. After some difficulty the point of the arrow was raised above the sternum and it was extracted without the loss of an ounce of blood, the edge grating against the sheath of the innominata artery during the operation. His health underwent a remarkable improvement, and the operator, in January, 1869, reported him perfectly well. His pension was not allowed.

Private Spillman, 7th Cavalry, was wounded June 12, 1867, about a mile from Fort Dodge, Kansas, by a party of Kiowa who made a dash upon the herd of horses he was guarding. He received three arrow wounds—one in the right shoulder; one in the right side, striking the rib; and a third through the right lumbar region, penetrating the abdominal cavity eight inches or more. The last-mentioned wound was enlarged, two fingers were inserted on each side of the shaft until the base of the iron head was reached, the fingers serving as a guide and protection when, traction being made, the arrow was withdrawn. The wound proved mortal.

Private Livingston, 3d Cavalry, was wounded, October 6, 1866, at Fort Stevens, Colorado. An arrow entered the right side of the thorax between the first and second ribs. He pulled it out immediately, stating that a great gush of blood followed. He was conveyed in an ambulance over a rough mountain road to Fort Garland, Colorado, where he arrived on the 12th in a weak condition and suffering from dyspnœa. He was successfully treated and returned to duty in the following February.

In February, 1868, an arrow with an iron head, shot by a Dakota Indian, entered the body of John Locke, sutler's employee, three inches to the right of the fifth lumbar vertebra. The arrowpoint came out two inches below the ensiform cartilage. The arrowshaft was withdrawn by cutting it in two and drawing the anterior half out of the anterior opening, the posterior half out of the posterior opening. The patient lost about eight ounces of blood at the time, and a small quantity internally during the evening following the injury; he was confined to bed about two weeks, had much irritative fever and circumscribed peritonitis. Four weeks afterward he was walking about, and was able to attend to his duties by July 1. He was attended by Surgeon C. E. Goddard, of Fort Rice, Dakota.

The records made by army surgeons, as well as specimens exhibiting arrow wounds in the Army Medical Museum, testify

to the wonderful endurance of the subjects, and combine surgical interest with the long story of Indian warfare.

To-Kah K-ten, or "He-that-kills-his-enemy," an Indian scout at Fort Buford, Dakota, received, January 3, 1870, an arrow-wound in the pelvis and abdomen. The projectile entered from behind and ranged upward; the shaft, which penetrated twelve inches, was pulled out by the patient, but the head, which penetrated three inches deeper, remained in the wound. The case received surgical treatment and progressed favorably until peritonitis supervened, and death ensued on January 18.

Corporal Monaghan, Co. C, 31st Infantry, was wounded in an Indian skirmish near Fort Buford, Dakota, November 6, 1867, by an arrow which entered below the inferior angle of the right scapula, and, passing around the ribs, came to the front. He walked two miles to the hospital with the arrow sticking in him. An incision was made and the arrowpoint extracted two inches above and a little to the outside of the right nipple, while the shaft was drawn back and removed through the wound of entrance. By November 26 both wounds had healed and the patient returned to duty.

Fig. 68 represents an interesting case of arrow wound, the history of which is as follows:

Satamore (Set-emâ'-i), a wild Indian, chief of the Kiowa, in 1862 led his tribe in war against the Pawnee, and engaged in a fight with them near Fort Larned, Kansas. He was on horseback, and coming to close quarters, threw himself to the opposite side of his horse after the manner of Indians. A Pawnee on foot, and within a few paces, fired from behind an arrow which, just missing the horse's backbone, entered the Indian's buttock. The shaft was withdrawn, leaving the iron arrowpoint in his body. He passed bloody urine, but the wound soon healed, and in a few weeks he was able to go on the hunt for buffalo without inconvenience. For more than six years he continued at the head of his band, leading it in all its travels and adventures or

the chase. The presence of the arrowpoint troubling him, in August, 1869, he applied to Assistant-Surgeon W. H. Forwood,

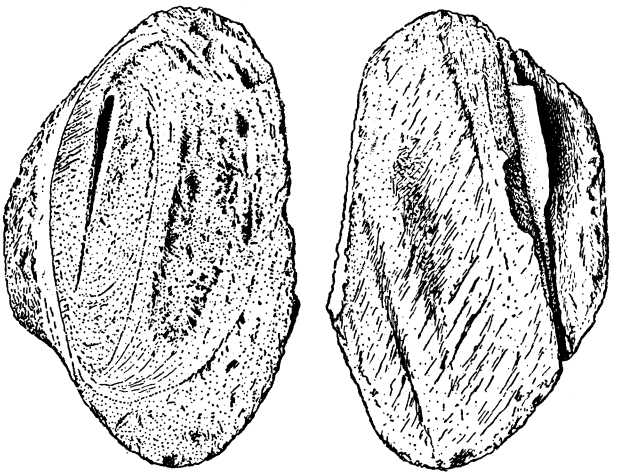

FIG. 68—Calculus containing iron arrowhead, taken from bladder of the Indian chief "Satamore," seven years after wound. Natural size. (Army Med. Mus., cat. 5931.)

U. S. A., at Fort Sill, and revealed what to the Indian was regarded as a deep secret. A surgical examination revealed a vesical calculus. The operation of lithotomy was performed with the assistance of Assistant-Surgeon Kilbourne, U. S. A., the calculus was removed, and on being sawed in two revealed the presence of the arrowpoint as its nucleus. The figure shows the calculus with the arrowpoint still in it. Its weight was eight hundred and fifteen grains and consisted of an almost uniform deposit of triple phosphates.

FIG. 69—Human vertebræ containing iron arrowhead. Subject killed in Indian fight near Fort Concho, Texas, 1869. (Army Med. Mus., cat. 5673.)

Fig. 69 shows an iron arrowpoint impacted in the right transverse process of the fourth dorsal vertebra and posterior extremity of the rib. It was taken from the body of a white man who was

killed by Indians, in 1869, near Fort Concho, Texas. The post mortem developed not fewer than four arrowpoints in his lungs and heart.

Fig. 70 represents the point of an iron, or apparently steel, arrow- or knife-point which has been shot or thrust into the thoracic vertebra, passing directly into the spinal cord, producing instant death.

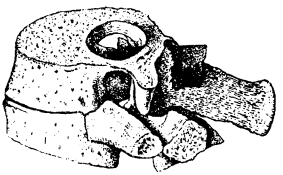

Fig. 70—Thoracic vertebra with iron arrow- or knife-point passed directly into spinal cord, resulting in instant death. (Army Med. Mus., cat. 9246.)

Fig. 71 shows a specimen of buffalo-rib with a transfixed arrowpoint and the broken arrowshaft by its side. The penetration and binding of the arrowpoint emphasize the force with which it was shot from the bow.

Many stories are told in regard to the force of arrows shot by Indian bowmen. It is said that an arrow has been driven through a buffalo or horse when not intercepted by a bone. A specimen is reported in the Army Medical Museum with the arrowpoint transfixed in the scapula, *from the interior;* that is, after having passed through the body of the animal.

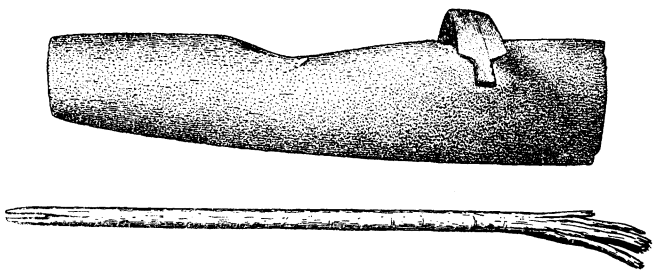

FIG. 71—Buffalo rib with transfixed iron arrowhead; broken arrowshaft by its side. (Army Med. Mus., cat. 7088.)

Plate XVIII, *a*, *b*, *c*, represents portions of the rib and shoulder-blade of buffalo which have been transfixed by arrows fired by Indians in the chase. They were obtained by Prof. Joseph Henry of the Smithsonian Institution, and deposited in the Army Medi-

cal Museum. The iron arrowpoints are still in the wounds. The specimens are introduced to illustrate the force with which an arrow can be shot by the bow, and, because of its initial velocity, there is no comminution of the bones. The edges around the wounds are not fractured or fissured on either side; there are n splinters made by the arrow on entering or leaving. This is due to the same principle that a pistol ball fired at short range passes through a pane of glass without shattering it.

A paper by W. Thornton Parker, M.D.,[1] describes the arrow and its mode of manufacture, and magnifies the malignity of arrow wounds. The author explains the apocryphal difference between hunting and war arrows, saying:

> The head of the war arrow is shorter and broader than that of the hunting arrow, and is attached to the shaft at right angles with the slot which fits the bow-string, the object being to allow the arrow in flight more readily to pass between the human ribs, while the head of the hunting arrow, which is long and narrow, is attached perpendicularly to the slot, to allow it to pass readily between the ribs of the running buffalo.

Ashhurst[2] wrote an extensive article on arrow wounds. He takes a favorable view of the curability of arrow wounds, which is borne out by the cases cited, and says:

> Those penetrating the chest and wounding the lung, although serious, are by no means mortal. . . . If the patient survives the hemorrhage, the prognosis is favorable, for the consecutive inflammation is usually trifling and requires no treatment beyond placing the patient at rest and affording a supply of pure warm air.

His table of arrow wounds in the chest shows that out of eighteen cases there were thirteen deaths.

Dr Kilbourne,[3] in an address delivered before the Buffalo Medical Club in 1881, tells of a prominent U. S. Army officer who,

[1] *Medical Times*, Nov. 17, 1883, XIV, pp. 127–129.
[2] *International Encyclopædia of Surgery*, II, p. 116.
[3] *Buffalo Medical and Surgical Journal*, XX, pp. 538–544.

while a subaltern, received a wound from a Comanche arrow. He remarks:

The weapon pierced the upper part of the right chest and passed nearly horizontally through the lung, the point protruding at the back between the scapula and the spine. He informed me that, at his own request, a silk handkerchief was fastened to the shaft, which was then pushed through his body, dragging the silk after it through the whole extent of the wound. He recovered and served actively in the army for many years after.

Eighty-three cases of arrow wounds, of which twenty-six proved fatal, are reported by the Surgeon-General,[1] U. S. A. Nearly all the fatal cases involved wounds in the three great cavities or in the larger bones or joints.

Plate XIX represents a number of arrows used by Indians in actual warfare. Most of them were removed from wounds by the operating surgeon.

Dr W. Thornton Parker[2] tells of a case of arrow wound under his own (temporary) treatment:

While passing through the little town of Trinidad, New Mexico [now Colorado], some years ago, I was called to see a man who had received a severe and apparently desperate arrow-wound through the right chest in a skirmish with Indians the day before. The arrow had penetrated quite through the right lung. The head had been detached and the shaft withdrawn. Some hemorrhage had followed, but he had recovered from the shock. I ordered cold water compresses and left Dover's powders with wine for convalescence. Some months after I met the patient in robust health driving a four-horse Rocky Mountain stage with only external marks of his wound remaining. His recovery had been rapid and regular. His lungs appeared sound, judging from the use he was able to make of them in shouting and halloaing.

Surgeon J. H. Bill,[3] U. S. A., describes the apparatus devised by himself and in use by other surgeons for the extraction of arrows. It will be needless to follow these in their details, but the

[1] Circular No. 3, August 17, 1891.

[2] *Philadelphia Medical Times*, Nov. 17, 1883, XIV, pp. 127–129.

[3] *American Journal of Medical Sciences*, N. S., XLIV, p. 365.

principle is that, using the arrowshaft as a guide by which to find the arrowhead, it shall be snared or seized in some way with a wire or loop or similar device by which the traction can be applied to the arrowpoint, when it, with the shaft attached, can be withdrawn.

Dr W. Thornton Parker [1] described the Indian method of removing arrowpoints when imbedded in the wound. He says a willow stick is split, the pith scraped out, and the ends rounded so that they may readily follow the arrow track. The pieces are introduced so as to reach and cover the barbs; they are then adjusted, bound to the arrowshaft, and all withdrawn together.

This brief account of arrow wounds does not pretend to be complete, nor to treat the subject from a surgical or scientific point of view. Those who desire to continue it, either scientifically or historically, may consult the following authorities in addition to those already cited:

Dr Gross. *A System of Surgery*, 4th ed., Philadelphia, 1866, I, p. 361.

Surgeon B. A. Clements, in Hamilton's *Military Surgery.*

Surgeon J. H. Bill, in *American Journal of Medical Sciences*, N. S., XLIV, p. 365.

Assistant Surgeon Elliott Coues, in *The Medical and Surgical Reporter*, 1866, XIV, p. 321.

Prof. C. A. Pope, in *St. Louis Medical and Surgical Journal*, January, 1864.

[1] *Medical Times*, op. cit., Nov. 17, 1883, XIV, pp. 127–129.